

# **Building 4623**

## **Guidelines for Test Operations**



**!** This Instruction Contains  
Descriptions of  
**HAZARDOUS OPERATIONS** **!**

Materials and Processes Laboratory  
Materials Test Branch, Building 4623

National Aeronautics and Space Administration  
George C. Marshall Space Flight Center  
Marshall Space Flight Center, AL 35812

Release Authority	Name	Title	Organization	Date
Office of Primary Responsibility	<u>[s] Gail H. Gordon</u>	Materials Test Branch Chief	EM10	11/15/05
	<u>[s] Dennis Davis</u>	Industrial Safety	QD50	11/16/05



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Revision	Date	Originator	Description	Affected Pages
Baseline	2/4/05	Eddie Davis	Document converted from ED36-OWI-050. Previous history retained in system as part of canceled or superseded ISO Document files.	All
A	11/17/05	Eddie Davis	Hazardous Operations notification added to cover	Cover, ii

This document baselines the Organizational Work Instruction (OWI) for the conduct of tests in Building 4623. Any deviation to this OWI **shall be approved** by the appropriate test engineer via an approved test plan

Any change to this OWI **shall be submitted** to and **approved** by the Materials Test Branch Chief, EM10. Revisions may be also be submitted to the concurring organizations listed below for review and concurrence by memo. The original OWI and all changes **shall be maintained** by EM10.

Concurring organizations:  
Building 4623 Test Operations Contractor  
EM10 COTR  
Environmental Health, AD60M

**CHECK THE MASTER LIST -- ONLY THE LATEST VERSION IS VALID**

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## 1.0 Scope

### 1.1 Scope

The scope of this Organizational Work Instruction (OWI) includes all general operations performed in Building 4623 at Marshall Space Flight Center.

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### 1.2 Purpose

The purpose of this OWI is to establish the basic operating policies and procedures necessary to ensure the safe and efficient operation of Building 4623.

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### 1.3 Applicability

This instruction applies to the Chemistry Team, Materials Test Branch, of the Materials and Processes Laboratory.

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## 2.0 Applicable Documents

Current revision of the EM10-OWI-CHM for the specific task being performed

ED-OWI-057. *Building 4623 Oxygen Supply System.*

EM10-OWI-058. *Chemical Hygiene Plan for Building 4623.*

MPD 1840.3. *MSFC Respiratory Protection Program.*

MPR 1040.3. *MSFC Emergency Plan.*

MPR 1840.2. *MSFC Hazard Communications Program.*

MPR 8715.1. *MSFC Safety, Health, and Environmental (SHE) Program.*

MPR 8823.2. *Pressure Systems Guidelines and Certification Requirements.*

MWI 3410.1. *Personnel Certification Program.*

MWI 8621.1. *Close Call and Mishap Reporting and Investigation Program.*

NHB 8060.1B. *Flammability, Odor, Offgassing, and Compatibility Requirements and Test Procedures for Materials in Environments That Support Combustion.*

NASA-STD-6001. *Flammability, Odor, Offgassing, and Compatibility Requirements and Test Procedures for Materials in Environments That Support Combustion.*



**Note:** Personnel **shall** always **refer** to the current revision of each applicable document.

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## 3.0 Definitions

### 3.1 Definitions

NASA. Marshall Space Flight Center EM10 responsible personnel.

*Test engineer.* The person responsible for correctly following the approved test plan for a specific test from sample receipt to test data evaluation.

*Test operator.* The person responsible for conducting the test under the guidance of the test engineer.

### 3.2 Acronyms

$GN_2$	Gaseous Nitrogen
GOX	Gaseous Oxygen
$LN_2$	Liquid Nitrogen
LOX	Liquid Oxygen
MSDS	Material Safety Data Sheet
MUA	Materials Usage Agreement
OWI	Organizational Work Instruction
PPE	Personal Protective Equipment

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## 4.0 Instructions

### 4.1 General Facility Instructions

4.1.1. Explicit emergency shutdown procedures **shall be posted** in a prominent location at each test control console.

4.1.2. Test operators **shall**:

- **Keep** applicable test OWIs and Material Safety Data Sheets within view during all test and maintenance operations
- **Read** the test material's MSDS to ensure familiarity with all safety precautions associated with the material
- **Verify** that the test engineer is aware of all highly hazardous, reactive, or toxic components of the test material.

4.1.3. The *test engineer* **shall direct** the test operator in proper safety procedures concerning test materials.

### 4.2 Flammable Liquids

4.2.1. **Shall be stored** in flame-proof cabinets, located in the Sample Preparation Laboratory and the Chemical Storage Room.

4.2.2. **Shall not be used** near open flame or hot surfaces.

4.2.3. **Shall always be used** with adequate ventilation (vent hood) and appropriate protective clothing (flame-proof smock, face shield, goggles, gloves).

4.2.4. **Shall be used** in accordance with the applicable sections of MPR 8715.1. *MSFC Safety, Health, and Environmental (SHE) Program.*

### 4.3 High-Pressure Gases

4.3.1. During pressurization of test equipment in which the test requires pressures above ambient pressure (14.7 psia), all personnel **shall be clear** of the testing area as indicated below:

- No personnel access to test cells containing pressurized equipment
- Test cells 1 through 4 (Rooms 126A-126D): No access if testing in cells 1 (Room 126A), 2 (Room 126B), or 3 (Room 126C)



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**Note:** The equipment in cell 4 (Room 126D) is operated at ambient pressure; therefore, it does not affect operations in cell 3 (Room 126C) or the equipment room (Room 126E).



- Test cells 9 through 12 (Rooms 114, 112, 110, and 108) and South Hallway (Room 116): No access if testing in cells 9, 10, 11, or 12.

4.3.2. All operations involving compressed gases shall be conducted using the buddy system. Periodic voice or visual contact between the person performing the task and one other person shall be maintained during all operations involving compressed gases. Periodic, for this requirement, is defined as a maximum of 15 minutes between contacts.

4.3.3. All test operators shall be instructed on the nature of hazards associated with compressed gases. (See section 10.0)

4.3.4. Test operators **shall verify** that test chambers are at ambient pressure before opening or disassembling.

4.3.5. Test operators **shall verify** that high-pressure lines, valves, *etc.*, are at ambient pressure before performing any maintenance.

4.3.6. When performing maintenance on the facility GN<sub>2</sub> system, test operators **shall deactivate** the facility GN<sub>2</sub> system by closing the two valves located behind the control panel out-side of the facility at the east end of Building 4623. After the system is deactivated, it shall be locked out/tagged out. *If the system cannot be feasibly locked-out*, then a tag alone will suffice but additional safety measures shall be taken to provide equivalent safety available from the use of a lockout device. The additional safety measures shall be noted on the tag (fuse removal, valve closed, power cable disconnected, *etc.*). The tag shall contain the following information: name of the authorized employee applying the tag, his/her phone number, his/her company or organization, date tag is applied, and a brief description of the work being performed.

4.3.7. Test operators **shall perform** all leak checks remotely, using GN<sub>2</sub> or other inert gas and a liquid oxygen- (LOX-) compatible leak check compound.

## 4.4 Cryogenics

4.4.1. When handling or transferring cryogenics, safety shoes, thermal gloves, a clean laboratory coat or coveralls, and safety glasses or a safety shield shall be worn.

4.4.2. Valves shall be closed in the proper order, as directed in the appropriate test OWI, to assure that cryogenics are not trapped in lines.



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4.4.3. Cryogenics shall not be stored in unvented containers.

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## 4.5 Test Apparatus

4.5.1. Test operators **shall place** on the control console the sign warning that personnel are working in the test cell.

4.5.2. The safety precautions listed in each test OWI **shall be followed**.

4.5.3. Warning lights **shall be activated** at the beginning of test setup for each cell and **shall remain activated** throughout the test operation.

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## 4.6 Associated Mechanical and Electrical Equipment and Tools

All test operators **shall**:

4.6.1. **Use** good laboratory practices in the handling of all tools and equipment.

4.6.2. **Keep** equipment manuals and any other pertinent support information within easy reach of the operator during all operations.

4.6.3. **Return** tools and equipment to appropriate storage areas at the end of each shift. **Maintain** all test cells at a good level of housekeeping, *i.e.*, visually clean and neat.

4.6.4. **Not store** extraneous items, *e.g.*, extra tools, non-applicable manuals, spare parts, in test cells.

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## 4.7 Personnel Control (Facility Management)

To maintain adequate control of personnel in the testing area and to ensure the safety of all personnel, adherence to the following procedures **shall be required** whenever any test cell is in operation.

4.7.1. During normal business hours, test activities require the presence of the test operator(s) and at least one other person. Normal business hours are between 7:00 a.m. and 3:30 p.m., Monday through Friday, excluding Government holidays. Test activities occurring outside normal business hours require the presence of the test operator(s) and a test engineer. When only two people are in the building, only one tester **shall be operated**, and the other person **shall be cognizant** of the test operator's activities. This **shall be achieved** either through periodic voice contact or through use of a video monitoring system. Periodic, for this requirement, is defined as a maximum of 15 minutes between contacts.

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4.7.2. All external personnel entry doors **shall be closed and secured**, with the exception of the main entrance on the north side of the west end of the building.

4.7.3. Vehicle and pedestrian gates into the fenced area south of Building 4623 **shall be locked** at all times. Entry **shall be allowed** into this area only after verifying no hazardous operation is underway. Persons in the fenced area to perform maintenance or repair operations when hazardous operations are being performed **shall remain** at least 50 ft away from the test cells in which the hazard exists.

For testing in this facility, *hazardous operations* include any of the following:

- Pressurization of any portions of a test system above ambient pressure
- The use of any oxygen-enriched test media
- The use of any materials at cryogenic temperatures
- The use or venting of any potential asphyxiants or otherwise hazardous chemicals (per the MSDS).

4.7.4. The facility warning beacon for an individual test cell **shall be activated** during all test activities. When the warning beacon adjacent to any test cell is activated, all of the perimeter flashing red lights are activated automatically. In addition, when the perimeter lights are on, no one **shall be permitted** in the fenced area to the south of the building or on the roof of the building without approval of the test engineer, in accordance with 4.7.3.

4.7.5. Personnel who have been exposed to LOX or gaseous oxygen (GOX) **shall ensure** that oxygen vapors do not remain absorbed in their clothing before smoking or approaching any source of ignition. This **shall be accomplished** by remaining in a well-ventilated area for 30 minutes after exiting the test area.

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## 5.0 Notes

Custodians for EM10-OWI-CHM-050	
Master List and Document Control	EM10 Management Support Assistant
Alternate Document Control	EM10 Group ISO Representative
Records	Materials Test Branch ISO Representative
Calibration	Materials Test Branch Calibration Contact
Memoranda	Materials Test Branch ISO Representative

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## 6.0 Safety Precautions and Warning Notes

### 6.1 Safety

6.1.1. Activities conducted in this facility shall be in strict accordance with MPR 8715.1, *MSFC Safety, Health, and Environmental (SHE) Program*. Any unsafe act or condition shall be reported to the area safety coordinator/monitor and/or the EM10B team lead immediately. Persons violating any safety regulation shall be challenged immediately.

6.1.2. All materials, including chamber housings, valve seats, seals, lubricants, etc., used in oxygen systems shall be approved for use in accordance with NHB 8060.1B or NASA-STD-6001 or the MSFC Materials Application and Evaluation Board (MAEB).

6.1.3. All oxygen systems shall be cleaned per MSFC-SPEC-164B, level 1A, unless otherwise specified in the applicable OWI or specification or approved in writing by the test engineer, with NASA EM10B concurrence.

### 6.2 Authorized Personnel

Only personnel specifically assigned to Building 4623 are authorized to perform testing in this facility.

### 6.3 Security and Warning Lights

Warning lights shall be activated in accordance with section 4.7.4.

### 6.4 Personal Protective Equipment

6.4.1. Appropriate personal protective equipment shall be worn as necessary to perform any testing, cleaning, repair, sample preparation, or other activity where the use of such safety equipment is mandated in the appropriate OWI.

6.4.2. Safety glasses shall be worn in test cells at all times.



### 6.5 Responsibility

It is the responsibility of each person in the facility to be knowledgeable of and abide by MPR 8715.1, *MSFC Safety, Health, and Environmental (SHE) Program*, and the applicable tester OWI. The area safety monitor/coordinator has responsibility for assuring all of the security procedures and safety provisions of the testing facility

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are followed. All test engineers **shall assure** test activities are in compliance with facility safety procedures, as identified in the applicable test OWI.



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## 8.0 Records

Records for Building 4623 **shall consist** of (a) memoranda that contain test results and that are stored electronically in the Materials and Processes Technical Information System (MAPTIS) and (b) calibration records.

### 8.1 Memoranda

Memoranda containing test results **shall be retained** indefinitely by EM10. These memoranda **shall be stored** electronically in the MAPTIS database and **shall be accessible** by test request number or memorandum number.

### 8.2 Calibration Records

8.2.1. All equipment requiring calibration **shall be** in current calibration

8.2.2. Form EM10-F-018 (Figure 1, section 7.0) **shall be used** to document the calibration of all Category IV and Category V equipment.

### 8.3 Maintenance of Records

8.3.1. Memoranda less than 10 years old **shall be maintained** in ready-access files in MAPTIS; memoranda 10 years old or older **shall be automatically transferred** to historical files.

8.3.2. Calibration records **shall be maintained** on site for a minimum of 10 years, filed and indexed by test request number. These **shall be stored** in a manner that will protect them, *e.g.*, in a test folder stored in a metal file cabinet. After 10 years, calibration records **shall be transferred** to historical files.

8.3.3. The original test records **shall be saved** for a minimum of 5 years.



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## 9.0 Tools, Equipment, and Materials

Test equipment and materials **shall be used** and **maintained** as directed in the applicable OWIs.

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## 10.0 Personnel Training

Test operators **shall be credentialed** to operate test equipment as indicated in the individual test OWIs.

Sample preparation personnel **shall be credentialed** to prepare test samples as indicated in EM10-OWI-042, *Test Sample Preparation for Testing in Building 4623*.

Toxicity laboratory personnel **shall be credentialed** as indicated in the applicable OWIs.

Environmental Gas Laboratory personnel **shall be credentialed** as indicated in EM10-OWI-052, *Environmental Gas Laboratory*.

The nature of testing that occurs in Building 4623 is complex and involves potential hazards; therefore, all test operators **shall be** Category 1 credentialed before conducting any test, and all tester maintenance personnel **shall be** Category 2 credentialed.

- **Category 1 Credentials** qualify personnel to perform basic test operations.
- **Category 2 Credentials** qualify personnel to maintain and modify testing apparatus.

### Category 1 - Basic Operations

**Category 1 credentialing** requires that test operators complete the trainings specified in the applicable OWIs and an annual physical examination conducted by the medical facility at Marshall Space Flight Center (or equivalent), including a hearing exam.

The operator **shall demonstrate** knowledge of the test and equipment by completing two successful test sets under the supervision of the test engineer.

Test operators **shall thoroughly read** the test OWI as part of the credentialing process. They **shall sign** a statement that they have read and understand the OWI and **shall be issued** personal copies of the OWI. The test engineer **shall give** the candidate a written test covering the OWI. A copy of this test, along with the signed statement and the training record, **shall constitute** verification of credentials. Training records **shall be kept** on file as proof of training. These records **shall include** training expiration dates and required refresher courses.

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Credentials **shall expire** after a period of 2 years. After that time, recredentialing **shall be required**.

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## **Category 2 - Tester Maintenance and Modifications**

Personnel seeking **Category 2 credentials shall become** qualified and credentialled according to the specific tester OWI. Credentialling **shall be achieved** through training classes approved by the candidate's supervisor or through training classes completed during previous employment.

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**EMERGENCY PHONE NUMBERS**

**Emergency..... 911**

**Medical Center..... 4-2390**

**Industrial Safety..... 4-0046**

**Chemical Spills..... 4-4357**

**Safety Monitor**

**Building 4623..... 5-0358**